places closely enough to be of use, but still not at all identical with it; or is it, indeed, the very same as the realm of human life? Is the differential equation only a refinement upon the real law of physics, the irrational only an approximation to the actual number of nature? Is the universe stable or will it some day disappear, wind its way back into chaos, leaving nothing but the truths of mathematics still standing? Is it true that chance does not exist really but only in seeming, or is everything purely chance, and are the laws of the universe merely the curves which we have drawn through a random few of an infinitely compact set of points? The consideration of these problems is what we mean by the phi osophy of mathematics." A new book on this subject has recently been published by the Open Court Publishing Company, 122 South Michigan Ave., Chicago, Illinois. It is entitled "Lectures on the Philosophy of Mathematics" and is by James Byrnie Shaw of the Department of Mathematics of the University of Illinois.

The number of trigonometry text books on the market is so very large that the author of every new one feels called upon to explain in his preface just why he has added to the list. The preface to the new "Plane and spherical trigonometry" by Professor Leonard M. Passano of the Massachusetts Institute of Technology says that the chief aim of the text are brevity, clarity and simplicity. The text "aims to present the trigonometry in such a way as to make it interesting to students approaching some maturity, and so as to connect the subject, not only with the mathematics which the student has already had, but also with the mathematics which, in many cases at least, is to follow." The book a'ms to avoid the tendency to amplification which the author says trigonometry texts of late years have shown. The book is published by the Macmillan Company.

One of the most interesting chapters in the first course in calculus is the chapter on maxima and minima. The many practical problems that can be solved by the simple criteria given in the ordinary calculus text book interest the student exceedingly. They make him feel that the calculus has power. Mathematicians have always been interested in problems of maxima and minima. Those of the present day who are especially interested in the subject and who want a somewhat full treatment rather than the brief inadequate treatment given in the current text books will welcome the 193-page book on "The Theory of Maxima and Minima," by Professor Harris Hancock, of the University of Cincinnati, published by Ginn and Company.

PROBLEMS FOR SOLUTION.

Send all communications about problems to B. F. Finkel, Springfield, Mo.

2719. Proposed by R. P. BAKER, University of Iowa.

Show that, $2x(\log x)^2 - x(x-1)(x+3)\log x + (x-1)^2(3x-1)$ is negative for $1 < x < \infty$.

2720. Proposed by CAPT. A. A. BENNETT, C.A.R.C., Galveston, Texas.

Given three points, A, B, C, in a plane, draw from an arbitrary fourth point D the segments AD, BD, CD. Also draw rays AA', BB', CC', making equal (small) angles respectively with

segments AD, BD, CD. The triangle determined by the three rays does or does not contain the point D according as the original triangle ABC does or does not contain D.

Prove the theorem, considering also the case in which A, B, C, D, are concyclic.

2721. Proposed by G. PAASWELL, New York City.

A, B are the termini of a horizontal line of length w. At a point C in this line, at a distance k from A, is applied a force P making an angle φ with the vertical. Determine the family of curves extending from A to B (and below AB) such that an equal normal distribution of loading p per unit length of curve around the periphery of the curve, will hold in equilibrium the force P. The parameter of the family so determined will be p.

2722. Proposed by FRANK IRWIN, University of California.

The number of terms in the general polynomial of the nth degree in m variables and in that of the mth degree in n variables is the same. It would be interesting to devise schemes which, without assuming this result, should exhibit the terms of these polynomials in one-to-one correspondence with each other.

2723. Proposed by GEORGE Y. SOSNOW, Newark, N. J.

The feet of the perpendiculars from the intersection of the diagonals on the sides of a cyclic quadrilateral M are joined to form a second quadrilateral N. Prove that N is a quadrilateral of minimum perimeter inscribed in M.

2724. Proposed by FRANK IRWIN, University of California.

Show that there is a unique set of real values, $x_1, x_2, x_3, \cdots, x_n$, that satisfy the equation

$$x_1^2 + x_2^2 + \cdots + x_n^2 - x_1x_2 - x_2x_3 - x_3x_4 - \cdots - x_{n-1}x_n - x_n + \frac{n}{2(n+1)} = 0.$$

2725. Proposed by S. A. COREY, Albia, Iowa.

Establish the identity,

$$(r_1r_2 + c_1r_3r_4 + c_2r_5r_6 + c_1c_2r_7r_8)(a_1a_2 + c_1a_3a_4 + c_2a_5a_6 + c_1c_2a_7a_8)$$

$$\equiv (r_9r_{10}r_{11}r_{12})^{1/2} + c_1(r_{13}r_{14}r_{15}r_{16})^{1/2} + c_2(r_{17}r_{18}r_{19}r_{20})^{1/2} + c_1c_2(r_{21}r_{22}r_{23}r_{24})^{1/2}$$

where $r_9 = a_1r_1 - c_1a_3r_3 - c_2a_5r_5 + c_1c_2a_7r_7$, $r_{10} = a_1r_2 - c_1a_3r_4 - c_2a_5r_6 + c_1c_2a_7r_8$, $r_{11} = a_2r_1 - c_1a_4r_3 - c_2a_6r_5 + c_1c_2a_8r_7$, $r_{12} = a_2r_2 - c_1a_4r_4 - c_2a_6r_6 + c_1c_2a_8r_8$, $r_{13} = a_3r_1 + a_1r_3 - c_2a_7r_5 - c_2a_5r_7$, $r_{14} = a_3r_2 + a_1r_4 - c_2a_7r_6 - c_2a_5r_8$, $r_{15} = a_4r_1 + a_2r_3 - c_2a_8r_5 - c_2a_6r_7$, $r_{16} = a_4r_2 + a_2r_4 - c_2a_8r_6 - c_2a_6r_8$, $r_{17} = a_5r_1 + c_1a_7r_3 + a_1r_5 + c_1a_3r_7$, $r_{18} = a_5r_2 + c_1a_7r_4 + a_1r_6 + c_1a_3r_8$, $r_{19} = a_6r_1 + c_1a_8r_2 + a_2r_5 + c_1a_4r_7$, $r_{20} = a_6r_2 + c_1a_8r_4 + a_2r_6 + c_1a_4r_8$, $r_{21} = -a_7r_1 + a_5r_3 - a_3r_5 + a_1r_7$, $r_{22} = -a_7r_3 + a_5r_4 - a_3r_6 + a_1r_8$, $r_{23} = -a_8r_1 + a_6r_3 - a_4r_5 + a_2r_7$, and $r_{24} = -a_8r_2 + a_6r_4 - a_4r_6 + a_2r_8$.

2726. Proposed by E. H. MOORE, The University of Chicago.

Let $\alpha_1(x, y)$, $\alpha_2(x, y)$, $\alpha_3(x, y)$, $\alpha_4(x, y)$, $\kappa_1(x, y)$, $\kappa_2(x, y)$ be six real-valued continuous functions of (x, y) over the unit-square S: $(0 \leqq x \leqq 1;\ 0 \leqq y \leqq 1)$. Let α_1, α_2, α_3, α_4 be symmetric functions and of positive type, i. e., for every real-valued continuous function $\xi(x)(0 \leqq x \leqq 1)$ $\int_0^1 \int_0^1 \xi(x)\alpha_g(x, y)\xi(y)dxdy \geqq 0$. Prove the inequality:

$$(J_{15}'J_{26}''J_{37}'''J_{48}^{\text{iv}} - J_{16}'J_{28}''J_{35}'''J_{47}^{\text{iv}} - J_{25}'J_{46}''J_{17}'''J_{38}^{\text{iv}} + J_{26}'J_{48}''J_{15}'''J_{37}^{\text{iv}})\kappa_1\kappa_2\kappa_1\kappa_2 \geqq 0.$$

Here on the left there are four terms of which the first is

$$\int_0^1 \cdots \int_0^1 \alpha_1(u_1u_5)\alpha_2(u_2u_6)\alpha_3(u_3u_7)\alpha_4(u_4u_8)\kappa_1(u_1u_2)\kappa_2(u_3u_4)\kappa_1(u_5u_6)\kappa_2(u_7u_8)du_1 \cdots du_8;$$

thus the eight variables of integration $u_1 \cdots u_8$ are in order the eight arguments of the four functions $\kappa_1\kappa_2\kappa_1\kappa_2$ while the "integration" symbols J indicate how the variables are to be supplied as arguments to the four functions $\alpha_1\alpha_2\alpha_3\alpha_4$, e. g., J_{26}'' indicates that α_2 (the superscript'' determining the subscript 2) has the arguments u_2u_6.—Indicate another inequality of this type and determine the number of such inequalities.